

# **Gravina Access Project**

## ***Special Visual Flight Rules Analysis***

***Draft***



**Agreement 36893013  
DOT&PF Project 67698  
Federal Project ACHP-0922(5)**

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## **Executive Summary**

This technical memorandum presents an analysis of the air traffic impacts in the Ketchikan airspace resulting from the bridge alternatives under consideration for the Gravina Access Project. The assumption underlying this analysis is that Special Visual Flight Rules (SVFR) operations in the Ketchikan Class E airspace would be prohibited or the minimum altitude would be adjusted to provide adequate clearance between a bridge and aircraft. The effect on aircraft operations as a result of the elimination of SVFR activity for the bridge alternatives is assessed.

It is projected that by 2025, a maximum of 1.9% of the total floatplane operations could be delayed as a result of flight conditions falling below Visual Flight Rules (VFR) minimums (less than 1,000-foot ceilings or less than 3 miles visibility). The greatest number of SVFR operations delayed is estimated to occur during July, August, and September, as these are the peak months for floatplane operations.

Realistically, it is fair to assume that not all of the operations currently occurring under the SVFR will be eliminated but, rather, a portion will be delayed. It is also possible that the Federal Aviation Administration (FAA), through a public review process, will adjust the minimum SVFR altitude in the Ketchikan airspace to provide sufficient separation between a bridge structure and aircraft. Floatplane operators may experience more delays during mornings and evenings when ceiling and visibility conditions more commonly fall below VFR minimums. Though beyond the focus of this report, general aviation and commercial pilots may, in response, choose to change their fleet mix and/or schedules of operations or employ other measures in order to provide service to their clients.

The following bullets outline the results of this report:

- Ketchikan airspace does not prescribe minimum altitudes for general aviation (GA) pilots. GA pilots need only remain 500 feet from any person or manmade structure unless taking off or landing. Commercial air taxi or commuter pilots operating under VFR conditions must remain 500 feet from the surface in Ketchikan airspace.
- A few certified commercial operators are currently allowed to fly down to 200 feet from the surface as long the visibility remains greater than 3 miles and wind speed does not exceed 12 knots.
- Ketchikan airspace is seasonally very busy and congested. Floatplane operations are forecast to reach 162,523 annually and, of that amount, SVFR operations are forecast to reach 3,377 by 2025. SVFR operations are forecast to account for a high of 3.6% in January and a low of 0.6% in May of the total floatplane operations.
- Total hours below VFR minimums are anticipated to account for 5.7% of the total annual flying hours. Total hours below 500 feet are anticipated to account for 1.0% of the total annual flying hours.
- Any bridge alternative crossing Tongass Narrows may require adjustment or elimination of SVFR regulations in Ketchikan airspace. FAA will make this determination through a separate public hearing and review process. Other mitigation measures may also be identified as part of the FAA review.

- Based on the percentage of forecast SVFR floatplane operations and the percentage of hours for SVFR conditions, the impact to SVFR aircraft operations will be increased delays to a small percentage of the overall operations as a result of a change in minimum SVFR altitudes or the exclusion of SVFR operations altogether. GA and commercial pilots wishing to operate during SVFR conditions could expect to be delayed up to approximately 3 hours during mornings or evenings if SVFR operations are excluded or minimum altitudes are adjusted. This delay may be unacceptable for some time-sensitive flights and may result in some cancellations.

<b>Section</b>	<b>Page</b>
Executive Summary .....	SUM-1
1.0 Introduction .....	1
2.0 Existing Conditions .....	1
2.1 Ketchikan Airspace .....	1
2.2 Air Traffic Communications .....	2
2.3 Special Visual Flight Rules Criteria.....	2
3.0 Analysis.....	4
3.1 Data Collection .....	4
3.2 Methods.....	5
3.3 Results.....	6
3.3.1 Special Visual Flight Rules (SVFR).....	6
3.3.2 SVFR Operations using Exemption No. 4760.....	8
3.3.3 Evaluation of Delay to SVFR aircraft.....	11
3.4 Conclusions .....	13
4.0 References .....	14

#### **List of Tables**

Table 1 Total Aircraft Operations, Ketchikan Flight Service Station (1996-2001) .....	4
Table 2 SVFRs Issued, Ketchikan Flight Service Station (1996-2001).....	5
Table 3 Forecast of Floatplane Operations .....	5
Table 4 SVFRs Issued, Ketchikan FSS (1996-2001).....	7
Table 5 Base Year and forecast Floatplane and SVFR Operations (2001-2025).....	7
Table 6 Hourly Records for Conditions Below 1,000' Ceiling or Less than 3 Miles Visibility.....	8
Table 7 Hourly Records for Conditions Below 500' Ceiling and Greater than 2 Miles Visibility.....	9
Table 8 Hourly Records for Conditions Below 400' Ceiling and Greater than 3 Miles Visibility.....	9
Table 9 Summary of Hourly Weather Records.....	9
Table 10 Average Max. and Min. Daily Duration for Conditions Below 1,000' Ceiling or Less than 3 Miles Visibility .....	11
Table 11 Average Max. and Min. Daily Duration for Conditions Below 500' Ceiling or Greater than 2 Miles Visibility.....	11
Table 12 Average Max. and Min. Daily Duration for Conditions Below 400' Ceiling or Greater than 3 Miles Visibility.....	12

#### **List of Figures**

	<b>On or following page</b>
Figure 1 Ketchikan Class E Airspace .....	1
Figure 2 Ketchikan Airspace Cross Section.....	2
Figure 3 Comparison of the Average SVFRs Issued and Hours below 500 feet .....	10
Figure 4 Counts of Records Below VFR Minimums by Time of Day.....	12



## **1.0 Introduction**

This technical memorandum presents a scenario analysis of the air traffic impacts in the Ketchikan airspace resulting from the bridge alternatives under consideration for the Gravina Access Project. The assumption underlying this analysis is that Special Visual Flight Rules (SVFR) operations in the Ketchikan Class E airspace would be prohibited or the minimum altitude would be adjusted to provide adequate clearance between a bridge and aircraft. The effect on aircraft operations as a result of the elimination of all SVFR activity is assessed. It is important to note that any changes to SVFR for Tongass Narrows will be determined after a public review conducted by the FAA, separate from this project.

The Visual Flight Rules (VFR) operators included in this analysis are Title 14, CFR Part 91 and Part 135 operators. A Part 91 operator refers to that portion of civil aviation encompassing all facets of aviation except air carriers holding a certificate of public convenience and necessity from the Civil Aeronautics Board, such as air taxi and commuter operators, and large aircraft commercial operators, such as air carriers. Part 135 operators refer to either (1) an aircraft operator who conducts operations for hire or compensation in accordance with Title 14, CFR part 135 in an aircraft with 30 or fewer passenger seats and a payload capacity of 7,500 pounds or less or (2) an aircraft operator operating under Title 14, CFR part 135 that carries passengers on at least five round trips per week on at least one route between two or more points according to its published flight schedules that specify the times, day of the week, and places between which these flights are performed. The aircraft that a commuter operates has 30 or fewer passenger seats and a payload capability of 7,500 pounds or less.

More simply, Part 91 operators could be categorized as general aviation (GA). Part 135 operators could be categorized as air taxi or commuters.

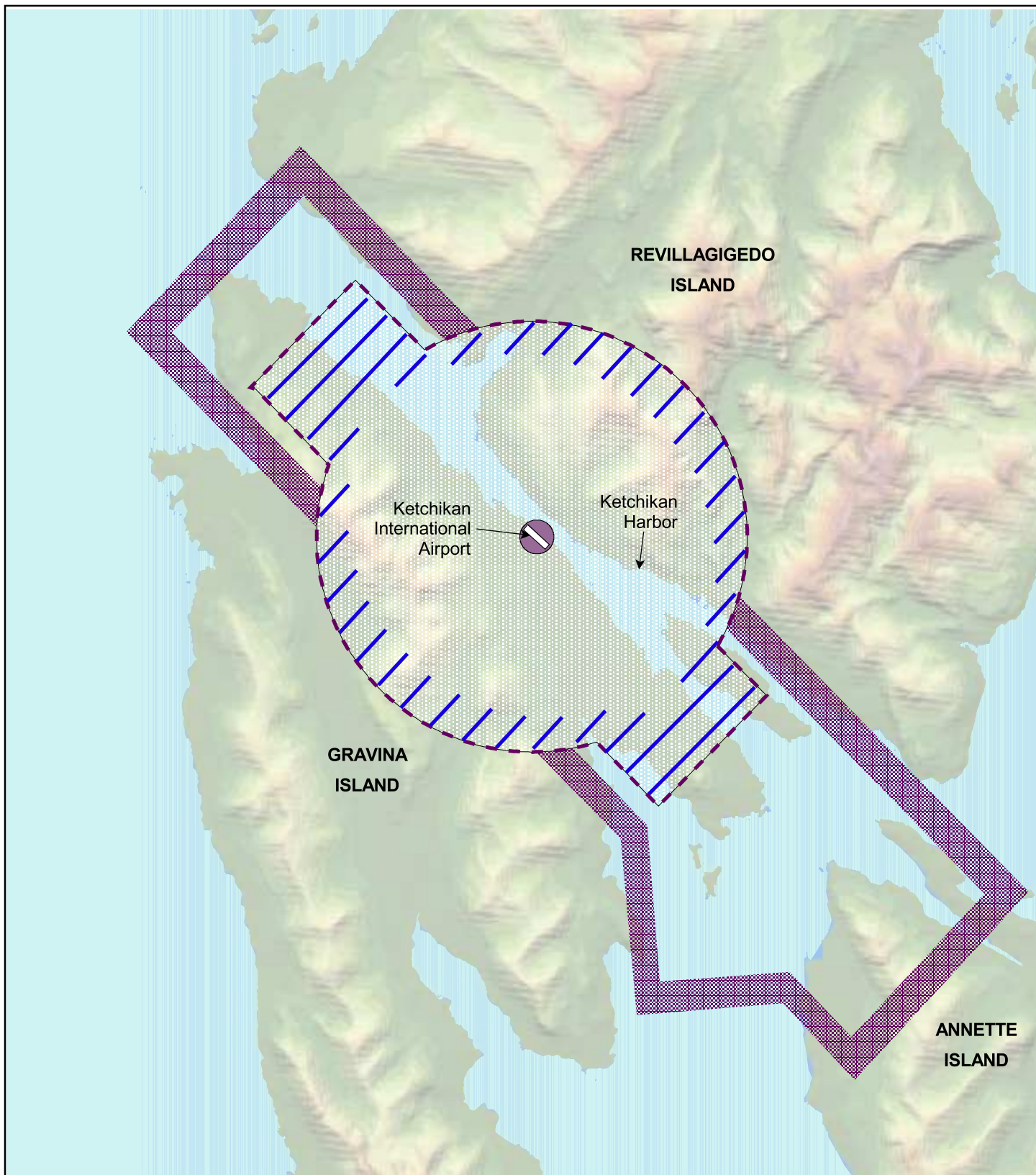
## **2.0 Existing Conditions**

### **2.1 Ketchikan Airspace**

The Ketchikan airspace has two types of Class E airspace: (1) Class E (700) with an airspace floor at 700 feet above the ground and (2) Class E (surface) with an airspace floor at the ground surface (Figure 1). The Class E airspace ceiling is at 18,000 feet above sea level. Basic VFR minimums for the Class E (700) airspace are set at 3 statute miles of flight visibility and the following distances from clouds: 500 feet below, 1,000 feet above, and 2,000 feet horizontal. The minimum altitude for Part 91 and Part 135 aircraft operating in the Class E (700) airspace is 700 feet above the ground.

While operating within the Class E (surface) airspace, pilots operating under Part 91 must maintain altitude sufficient to allow a safe landing if the aircraft power unit fails as per Title 14 CFR, Part 91, Section 119(a). They must, also maintain a distance of 500 feet from any person, vessel, vehicle, or structure as prescribed in Title 14 CFR, Part 91, Section 119(c). Part 135 operators are required to maintain a distance of 500 feet above the surface during the day, except when performing takeoff and landing procedures.





#### LEGEND



Ketchikan International Airport



Class E Airspace (surface)



Class E Airspace with floor  
700 ft. above surface



Special Airport Traffic  
Area F.A.R. Part 93

## Ketchikan Class E Airspace

DATE: November, 2001

0 1 2 3 4 5 Miles



**FIGURE 1**



Part 91 and Part 135 pilots operating below the minimum altitude for the Class E (700) airspace are considered to be operating in uncontrolled airspace where Part 91 pilots must only maintain a distance of 500 feet from any person, vessel, vehicle, vessel, or structure while Part 135 pilots must maintain a 500-foot minimum altitude above the surface. Under no circumstance, are pilots operating under VFR allowed to enter the Class E (surface) airspace without authorization from the Ketchikan Flight Service Station (FSS). During standard VFR there is no limitation on the number of aircraft allowed within the Class E (surface) airspace. The Ketchikan FSS manager estimates that as many as 15 to 16 VFR aircraft can be within the Class E (surface) at one time. During SVFR operations the maximum number of aircraft allowed to enter the Class E (surface) airspace is one, unless each pilot can maintain visual contact with other aircraft within the airspace. The Ketchikan FSS manager estimates a high average of 5 to 6 SVFR aircraft can operate within the Class E (surface) airspace under SVFR conditions while maintaining visual contact.

During Instrument Flight Rules (IFR), no other IFR, VFR, or SVFR aircraft are allowed within the Class E (surface) airspace, except certain certified Part 135 operators that are allowed to perform SVFR operations simultaneously with IFR aircraft.

## **2.2 Air Traffic Communications**

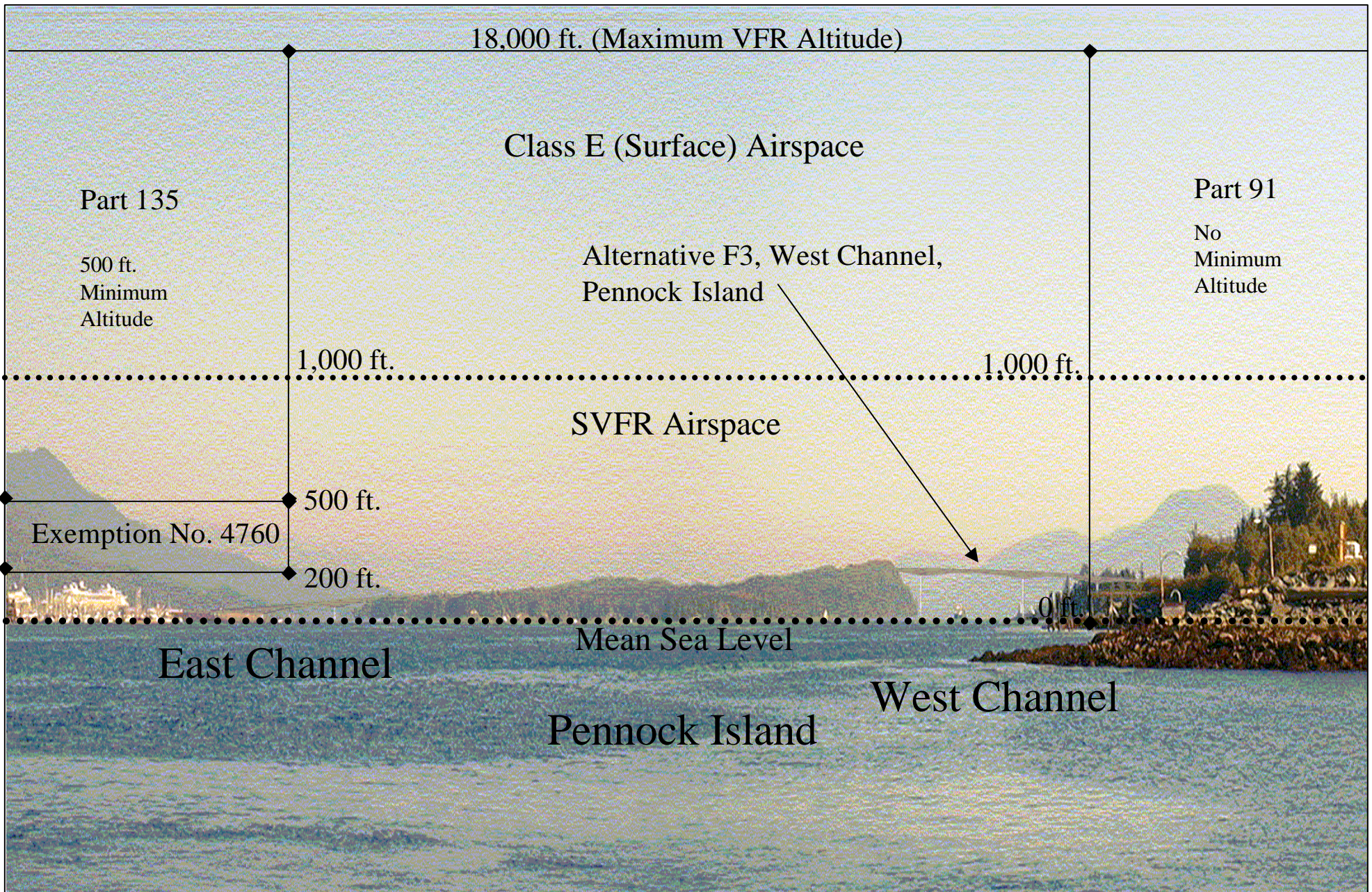
Special communication requirements (Title 14 CFR, Part 93.153) are in effect for persons operating aircraft under VFR to, from, or in the vicinity of the Ketchikan International Airport (KIA) or Ketchikan Harbor. When the Ketchikan FSS is in operation, no person may operate an aircraft within the Class E (700) or Class E (surface) airspace unless that person has established two-way radio communication with the Ketchikan FSS. For inbound flights, the pilot must announce position and intentions when no less than 10 miles from KIA and monitor the designated frequency until clear of the movement area on the airport or Ketchikan Harbor. For departing flights, the pilot must announce position and intentions prior to taxiing on to the active runway on the airport or onto the movement area of Ketchikan Harbor and monitor the designated frequency until outside the Class E (surface) airspace.

## **2.3 Special Visual Flight Rules Criteria**

Until VFR visibility and ceiling minimums drop below the basic VFR minimums for Class E airspace (3 miles visibility and 1,000 foot ceiling), pilots may perform VFR operations in accordance with the special communications requirements in Class E (surface) airspace. When visibility and ceiling conditions fall below VFR minimums (3 miles visibility and 1,000 foot ceiling), VFR pilots are required to receive a SVFR clearance from the Ketchikan FSS prior to entering the Class E (surface) airspace (Figure 2). The purpose of the SVFR procedures is to ensure that pilots receive appropriate traffic advisories, to control the number of aircraft in the airspace when VFR minimums fall below the specified parameters, and to separate IFR and VFR operations.

Per conditional acceptance by the Federal Aviation Administration (FAA), some certified Part 135 operators are exempt from the Part 135.203 500 foot minimum altitude while operating within the Class E (surface) airspace. Exemption No. 4760 permits an approved Part 135





## Ketchikan Airspace

Approximate scale at bridge.  
Objects in foreground appear taller than actual.



**FIGURE 2**

operator to operate seaplanes within the Class E airspace under a SVFR clearance below 500 feet above the surface. The FAA applies the following conditions and limitations to this exemption:

- (a) Operations are limited to seaplanes and amphibious aircraft being operated over water within an approved seaplane/amphibian SVFR corridor encompassing the Tongass Narrows and Ketchikan Harbor, and underlying the Ketchikan Class E airspace.
- (b) Operations are authorized only during the hours of daylight or during the hours of Alaskan Civil Twilight when the sun is not more than 6 degrees below the horizon.
- (c) Sky obscuration must exceed five-tenths cloud coverage and must preclude VFR flight at or above 500 feet above the surface before operations are authorized under the exemption.
- (d) Aircraft may be operated below 500 feet above the surface down to an altitude of 400 feet above the surface only when the flight visibility is at least 2 miles, the surface wind velocity along the approved route is 12 knots or less, and the height of the sea is 1 foot or less (Figure 2).
- (e) Aircraft may be operated below 400 feet above the surface down to an altitude of 200 feet above the surface only when the flight visibility is at least 3 miles, the surface wind velocity along the approved route is 12 knots or less, and the height of the sea is 1 foot or less (Figure 2).
- (f) Operations are authorized only over open waterways, and operators must observe the minimum safe altitudes for emergency landings and separation clearance set forth in Title 14, CFR part 91.119.
- (g) Operations are authorized only when wind and sea conditions allow for the safe accomplishment of an unscheduled landing.
- (h) Aircraft position and anti-collision lights must be on and functioning when operations are conducted under this exemption.
- (i) No aircraft may be operated under this exemption at an altitude of less than 200 feet above the surface.

Additionally, by performing operations under Exemption No. 4760, certificate holders have entered into agreement with the manager of the Ketchikan FSS and the manager of the Anchorage Air Route Traffic Control Center to allow simultaneous IFR and SVFR operations in the Ketchikan airspace, subject to the following conditions and limitations:

- (a) The agreement must establish a corridor for SVFR seaplane operations that is sufficiently separated laterally and vertically from IFR arrival and departure route profiles to allow concurrent IFR and SVFR flight with the Class E airspace.
- (b) The corridor will encompass the Tongass Narrows and Ketchikan Harbor.
- (c) Airspace within the corridor boundaries will extend from the surface of the water to 500 feet above the surface.

- (d) Authorization to use the corridor is dependant on each certificate holder having on file with the Ketchikan FSS a current and valid letter of agreement.
- (e) SVFR operations in the corridor may be suspended by the FAA without prior notice, when necessary, in the interest of safety.
- (f) An SVFR clearance will be issued for each flight conducted under the terms specified in each certificate holder's letter of agreement and this exemption.
- (g) Air Traffic advisories will be provided to IFR and SVFR traffic at any time the corridor is in use under the terms specified in each certificate holder's letter of agreement.

### 3.0 Analysis

This section presents the data collected, methods of analysis, and results of the analysis.

#### 3.1 Data Collection

The following data was collected for use in the analysis;

- *Ketchikan FSS, Air Traffic Data (1996-2001)*
- *KIA Master Plan, Air Traffic Forecast (May, 2000)*
- *KIA Automates Weather Observation Station, Surface Airways Data (1991-2000)*

Air traffic data was acquired from the Ketchikan FSS. The data reported five plus years (1996-2001) of counts in a monthly format for total aircraft contacted, IFR flight plans filed, VFR flight plans filed, pilot briefings, airport advisories, radio contacts, and over the counter pilot briefings. Data for October, November, and December of 2001 is not yet available.

Table 1 presents all aircraft contacted from 1996 to 2001. These values serve as a good indicator of the total aircraft operations in the Tongass Narrows since federal regulations require communication with the Ketchikan FSS prior to any activity in the airspace.

Table 1  
Total Aircraft Operations  
Ketchikan FSS 1996 - 2001

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Annual</u>
1996	5,314	5,926	7,804	8,960	12,841	14,307	17,208	16,879	11,443	7,467	5,871	5,365	119,385
1997	4,232	5,060	5,605	8,472	10,923	12,999	16,285	17,015	15,263	7,219	5,554	4,227	112,854
1998	4,079	4,565	6,486	8,038	11,680	13,501	15,319	15,181	10,494	6,492	5,286	4,289	105,410
1999	3,666	3,175	5,036	6,715	9,048	11,861	14,212	14,682	9,956	5,771	4,141	3,608	91,871
2000	3,372	4,169	5,050	6,628	11,122	14,380	15,684	16,023	10,586	6,838	4,795	4,190	102,837
2001	3,548	4,253	5,542	7,033	9,606	14,051	16,147	16,417	8,750	NA	NA	NA	NA

Source: Ketchikan FSS.

Table 2 presents the total SVFRs issued to pilots operating when the ceiling dropped below 1,000 feet and visibility dropped below 3 miles from 1996 to 2001.

Table 2  
SVFRs Issued  
Ketchikan FSS 1996 - 2001

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Annual</u>
1996	72	36	236	158	6	83	459	663	127	284	211	40	2,375
1997	427	218	52	22	115	258	463	473	351	77	16	10	2,482
1998	56	11	78	73	3	247	675	512	223	34	86	27	2,025
1999	239	101	21	51	122	87	420	385	377	136	0	200	2,139
2000	10	47	262	68	19	16	318	433	203	25	128	44	1,573
2001	71	41	31	24	135	72	328	204	110	NA	NA	NA	NA

Source: Ketchikan FSS.

The KIA Master Plan Update currently underway provides a 20-year forecast of air traffic activity for the KIA and Tongass Avenue float docks. The *Conditions and Needs Assessment* in which the forecast is presented is dated May 2000. As shown in Table 2, the forecast estimates over 100,000 floatplane operations annually for the next 20 years.

Table 3  
Forecast of Floatplane Operations

<u>Year</u>	<u>KIA*</u>	<u>Tongass Avenue Float Plan Docks</u>	<u>Total</u>
2003	20,221**	98,579	118,800
2008	21,578**	111,869	133,447
2018	24,572	137,951	162,523
2025	26,870***	150,850	177,720

\* These operations reflect the total floatplane operations and do not include wheeled operations on Runway 11/29.

\*\* KIA Master Plan.

\*\*\* HDR

Source: KIA Master Plan Update.

### 3.2 Methods

To determine the potential impact to SVFR operations in the Ketchikan airspace, aircraft activity data was compiled into a spreadsheet and then evaluated and sorted for duplicate entries and missing or invalid data. Values recorded in the *aircraft contacted* column of the aircraft activity data reflect all aircraft operating in the Tongass Narrows from 1996 to 2001. As discussed above, all aircraft are required to contact the Ketchikan FSS for operations in the Class E (700) and Class E (surface) airspace. The *aircraft contacted* category proves useful in that it reflects all aircraft operating in the Ketchikan airspace during the five-year period.

Based on historical monthly percentages of aircraft activity and the air traffic forecast for floatplanes presented in the KIA master plan, base year 2001 floatplane activity and corresponding SVFR operations were estimated. Growth rate percentages estimated in the air traffic forecast presented in the KIA master plan were used to estimate future floatplane and SVFR operations. Monthly floatplane and SVFR operations were estimated based on activity peaking characteristics presented in the master plan and historical data acquired from the Ketchikan FSS.

The Ketchikan FSS does not count SVFR operations conducted using Exemption No. 4760 separately from the total SVFR count. In an effort to evaluate the impacts to pilots operating under Exemption No. 4760 surface airways data was sorted to obtain monthly counts of hours for when:

1. Either ceiling height fell below 1,000 feet or visibility fell below 3 miles, and;
2. Ceiling height fell between 500 and 400 feet but visibility remained greater than 2 miles and wind speed less than 12 knots, and;
3. Ceiling height fell between 400 and 200 feet but visibility remained greater than 3 miles and wind speed less than 12 knots, and;

The first set of counts reflects time during which pilots operating under VFR are required to obtain a SVFR clearance from the Ketchikan FSS in order to enter the Ketchikan airspace. The second and third set of counts reflect time during which approved Part 135 pilots must perform SVFR operations under Exemption No. 4760. For accuracy, only those records that occurred during the hours for which the Ketchikan FSS was open (6am to 10pm) were included. The Ketchikan FSS does close at 9:30 pm between September and May, however, the Ketchikan AWOS records hourly and therefore, 10 pm was used for the entire year.

Initially, it appears that the most significant impact to SVFR aircraft operations will be increased delays as a result of adjustments to minimum altitudes in order to provide adequate clearance between a bridge and aircraft. Surface airways data was sorted to determine the median time of day and duration for when VFR minimums fell below the established VFR visibility minimums for SVFR operations and SVFR operations using Exemption No. 4760. Total, average, maximum, and minimum hours for each were calculated. Again for accuracy, only those records that occurred during the hours for which the Ketchikan FSS was open were included. Sorting and aggregating the data in this fashion allows for an evaluation of the severity of the potential delay to pilots wishing to perform SVFR operations.

### **3.3 Results**

#### **3.3.1 *Special Visual Flight Rules (SVFR)***

Table 4 presents the total, average, maximum, and minimum SVFRs issued to pilots operating under VFR from 1996 to 2001. It should be noted that data for October, November, and

December 2001 is not yet available and was therefore not included in the calculations for these months.

Table 4  
SVFRs Issued  
Ketchikan FSS 1996 - 2001

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Annual</u>
Total	875	454	680	396	400	763	2,663	2,670	1,391	556	441	321	10,594
Avg	146	76	113	66	67	127	444	445	232	111	88	64	2,119
Max	427	218	262	158	135	258	675	663	377	284	211	200	2,482
Min	10	11	21	22	3	16	318	204	110	25	0	10	1,573

Data for October, November., and December 2001 is not yet available and is not reflected in the above calculations.  
Source: Ketchikan FSS.

Table 5 presents the estimated number of total floatplane and SVFR operations per month through the year 2025. These estimates assume that the existing conditions under which SVFR operations are performed are not altered.

Base year (2001) floatplane and SVFR operations reflect five-year averages based on historical Ketchikan FSS aircraft activity data. Total annual floatplane operations for 2001 are estimated to be 105,192. Total annual SVFR operations for 2001 are estimated to be 1,984 or 1.8 % of the annual total floatplane operations. The greatest number of SVFR operations are estimated to occur during July, August, and September, as these are the peak months for floatplane operations.

Future floatplane and SVFR operations are based on the forecast of floatplane activity from the KIA Master Plan. As shown in Table 7, the annual SVFRs are anticipated to exceed 2,000 in the year 2003 and approach 3,500 by 2025 yet remain less than 2% of the annual total floatplane operations. Monthly percentages of SVFR operations are assumed to remain relatively stable through the forecast years.

Table 5  
Base Year and Forecast Floatplane and SVFR Operations (2001-2025)

Base Year (2001) Estimate

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Total</u>
Average Floatplane Operations	4,035	4,525	5,921	7,641	10,870	13,517	15,809	16,033	11,082	6,622	4,951	4,187	105,192
Average SVFR Operations	146	76	113	66	67	127	444	445	232	116	92	60	1,984
% of Total Operations	3.6%	1.7%	1.9%	0.9%	0.6%	0.9%	2.8%	2.8%	2.1%	1.8%	1.9%	1.4%	1.9%

Future 2003-2025

<u>2003</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Total</u>
Floatplane Operations	4,557	5,110	6,686	8,629	12,276	15,265	17,854	18,107	12,516	7,479	5,592	4,729	118,800
Estimated SVFR Ops	164	85	128	75	75	144	501	503	262	131	104	68	2,240

<u>2008</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Total</u>
Floatplane Operations	5,119	5,740	7,511	9,693	13,790	17,147	20,055	20,339	14,059	8,401	6,281	5,312	133,447
Estimated SVFR Ops	184	96	144	84	85	161	563	565	294	147	117	76	2,516
<u>2018</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Total</u>
Floatplane Operations	6,234	6,991	9,147	11,805	16,794	20,883	24,425	24,771	17,122	10,231	7,650	6,469	162,523
Estimated SVFR Ops	224	117	175	102	103	196	686	688	358	180	143	93	3,064
<u>2025</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Total</u>
Floatplane Operations	6,818	7,645	10,003	12,910	18,366	22,837	26,711	27,089	18,724	11,189	8,365	7,075	177,731
Estimated SVFR Ops	245	130	190	116	110	206	748	758	393	201	159	99	3,377

Source: HDR Alaska, Inc.

### 3.3.2 SVFR Operations using Exemption No. 4760

The Ketchikan FSS does not count SVFR operations conducted using Exemption No. 4760. SVFR operations conducted using Exemption No. 4760 are included in the total count of SVFR operations. Therefore, this section presents an evaluation of the meteorological conditions that require use of Exemption No. 4760. In an effort to evaluate the impacts to pilots performing SVFR operations under Exemption No. 4760, hourly surface airways data was acquired from the National Climatic Data Center (NCDC) for the years from 1991 through 2000 and includes wind speed, ceiling height, and visibility data collected by the KIA Automated Weather Observation System (AWOS). Approximately 90,000 hourly records were acquired from the Ketchikan AWOS. Surface airways data was sorted to determine the number of hours for which the ceiling, visibility, and wind speed fell within the parameters required for these operations. Sorting the meteorological data in this method provides an indication of the frequency of these conditions and allows a comparison to the total hours of FSS operation (5,840 hours) during which the majority of operations are anticipated to occur.

Table 6 presents the total, average, maximum, and minimum hourly records for ceiling conditions below 1,000 foot or visibility less than 3 miles. These parameters reflect the conditions necessary for SVFR operations in the Ketchikan airspace.

Table 6  
Hourly Records for Conditions Below 1,000-Foot Ceiling and less than 3 Miles Visibility  
KIA, AWOS 1991 – 2000

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Annual</u>
Total	455	287	221	99	114	142	326	339	491	264	244	359	3,341
Avg	45.5	28.7	22.1	9.9	11.4	14.2	32.6	33.9	49.1	26.4	24.4	35.9	334.1
Max	111	60	35	19	32	27	55	48	94	54	47	121	557
Min	9	2	10	3	0	4	9	11	18	6	1	12	255

Source: National Climatic Data Center. KIA AWOS, 1991-2000

Table 7 presents the total, average, maximum, and minimum hourly records for ceiling conditions below 500 foot and visibility greater than 2 miles, and wind less than 12 knots. These parameters reflect the conditions necessary for SVFR operations under Exemption No. 4760.

Table 7

Hourly Records for Conditions Below 500-Foot Ceiling and Greater than 2 Miles Visibility, Wind <12 Knots  
KIA, AWOS 1991 – 2000

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Annual</u>
Total	66	24	23	9	14	12	47	49	64	35	17	60	420
Avg	6.6	2.4	2.3	0.9	1.4	1.2	4.7	4.9	6.4	3.5	1.7	6	42
Max	25	5	6	4	5	3	9	11	32	15	4	17	61
Min	0	0	0	0	0	0	1	0	0	0	0	0	23

Source: National Climatic Data Center. KIA AWOS, 1991-2000

Table 8 presents the total, average, maximum, and minimum hourly records for ceiling conditions between 400 and 200 feet and visibility greater than 3 miles, and wind less than 12 knots. These parameters also reflect the conditions necessary for SVFR operations under Exemption No. 4760.

Table 8

Hourly Records for Conditions Below 400-Foot Ceiling and Greater than 3 Miles Visibility, Wind <12 Knots  
KIA, AWOS 1991 – 2000

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Annual</u>
Total	14	19	18	20	14	15	26	17	36	37	216	14	19
Avg	1.0	1.9	1.2	1.4	0.8	1.3	1.9	1.3	2.9	3.3	1.0	1.9	17.0
Max	6	10	6	5	5	3	12	4	9	9	6	10	33
Min	0	0	0	0	0	0	0	0	0	0	0	0	4

Source: National Climatic Data Center. KIA AWOS, 1991-2000

Table 9 summarizes the above meteorological data and compares them to the total hours of operation for the Ketchikan FSS.

Table 9

Summary of Hourly weather Records  
KIA, AWOS 1991 – 2000

	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Annual</u>
Total FSS Hours (6am – 10pm)	496	448	496	480	496	480	496	496	480	496	480	496	5,840
Avg. Hrs. below 1,000 ft. or 3 mi. Visibility	45.5	28.7	22.1	9.9	11.4	14.2	32.6	33.9	49.1	26.4	24.4	35.9	334.1
% of Time below 1,000 ft. or 3 mi. Visibility	9.2%	6.4%	4.5%	2.1%	2.3%	3.0%	6.6%	6.8%	10.2%	5.3%	5.1%	7.2%	5.7%

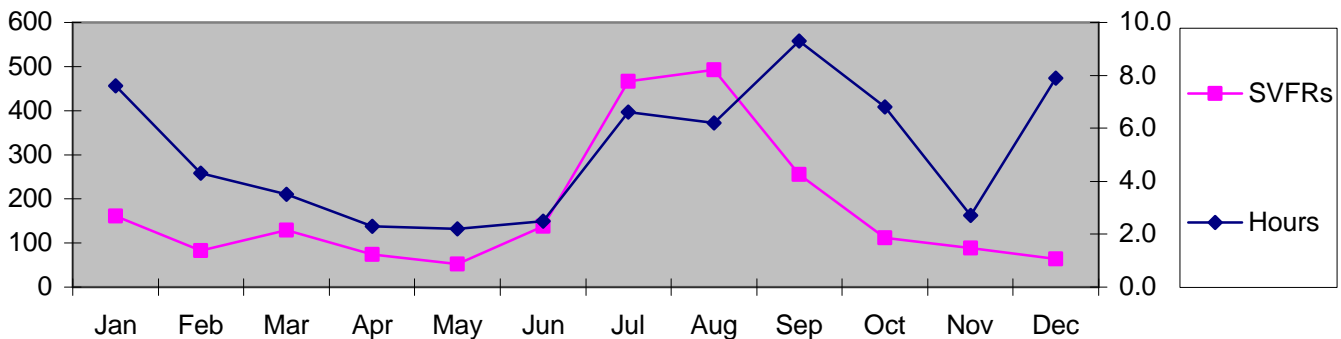
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Hrs. below 500 ft. with 2 mi. Visibility, <12 Knot Winds	6.6	2.4	2.3	0.9	1.4	1.2	4.7	4.9	6.4	3.5	1.7	6	42
% of Time below 500 ft. with 2 mi. Visibility, <12 Knot Winds	1.3%	0.5%	0.5%	0.2%	0.3%	0.3%	0.9%	1.0%	1.3%	0.7%	0.4%	1.2%	0.7%
Avg. Hrs. below 400 ft. with 3 mi. Visibility, <12 Knots Winds	1.0	1.9	1.2	1.4	0.8	1.3	1.9	1.3	2.9	3.3	1.0	1.9	17.0
% of Time below 400 ft. with 3 mi. Visibility, <12 Knots Winds	0.2%	0.4%	0.2%	0.3%	0.2%	0.3%	0.4%	0.3%	0.6%	0.7%	0.2%	0.4%	0.3%

Source: National Climatic Data Center. KIA AWOS, 1991-2000

As shown in the above table, the average annual hours below VFR minimums for the ten-year period are estimated to be 334 or 5.7% of the total flying hours (Ketchikan FSS hours of operation). The hours for which Part 135 pilots must use Exemption No. 4760 are estimated to be 1% (0.7% for 500 ft. + 0.3% for 400 ft.) of the total flying hours. This data represents the percent of time weather conditions exist that will require the use of Exemption No. 4760. It is likely that due to the overall poor flying conditions that actual number of operations delayed would be less than the total amount of time would suggest.

Figure 3 presents the average SVFRs issued and the average hours below a 500-foot ceiling from 1996 to 2000 for purposes of comparison.

Figure 3  
Comparison of the Average SVFRs Issued and Hours below a 500-foot ceiling  
KIA 1996 – 2000



Source: HDR Alaska, Inc.

As shown in Figure 3, the summer increase starting in June in SVFR operations shows some relation to the summer increase in hours below a 500-foot ceiling. Conversely, SVFR operations during winter months (December and January) do not correspond well. This variation reflects the seasonality of Ketchikan's aviation demand. Annual weather patterns remain relatively constant from month to month. Aviation demand reflects the current social and economic conditions of the area served and is subject to change. Currently, aviation demand increases during summer months and decreases during winter months as a result of demand related to the

tourism and fishing industries. Were a wintertime source of aviation demand introduced into Ketchikan you could expect to see a corresponding increase in SVFR operations during those months also.

Based on the above analysis of forecast total SVFR operations and the examination of the frequency of conditions required for use of Exemption No. 4760, it is anticipated that there will be a slight increase in delays as a result of a change in minimum SVFR altitudes of the exclusion of SVFR operations altogether. As such, the following discussion evaluates the current weather conditions in relation to average time of day and average event duration for weather events requiring SVFR Exemption No. 4760 aircraft operations.

### 3.3.3 Evaluation of Delay to SVFR Aircraft

This section presents an evaluation of the average daily duration for meteorological events for when SVFR operations including Exemption No. 4760 are currently required. Table 10 presents the average daily duration of hours below VFR minimums (1,000 foot ceiling or 3 Miles visibility) for each month of the year.

Table 10  
Average, Maximum, and Minimum Daily Duration for Conditions below 1,000 foot Ceiling or Less than 3 miles Visibility  
KIA, AWOS 1991 – 2000

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Annual</u>
Avg	3.4	2.8	2.7	2.3	2.7	2.8	3.0	3.3	3.4	2.8	3.0	3.3	3.0
Max	23	20	18	9	11	20	26	24	19	13	17	30	30
Min	1	1	1	1	1	1	1	1	1	1	1	1	1

Source: National Climatic Data Center. KIA AWOS, 1991-2000

Table 11 presents the average daily duration of hours below a 500-foot ceiling and greater than 2 miles visibility; wind less than 12 knots for each month of the year.

Table 11  
Average, Maximum, and Minimum Daily Duration for Conditions below 500 foot Ceiling and Greater than 2 miles Visibility, Wind <12 Knots  
KIA, AWOS 1991 – 2000

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Annual</u>
Avg	1.5	1.3	1.4	1.5	1.4	1.2	1.5	.15	1.5	1.5	1.2	1.6	1.2
Max	9	2	3	3	3	2	4	4	4	5	2	5	6
Min	1	1	1	1	1	1	1	1	1	1	1	1	1

Source: National Climatic Data Center. KIA AWOS, 1991-2000

Table 12 presents the average daily duration of hours below 400 feet and greater than 3 miles visibility, wind less than 12 knots for each month of the year.

Table 12

Average, Maximum, and Minimum Daily Duration for Conditions below 400 foot Ceiling and Greater than 3 miles Visibility, Wind <12 Knots  
KIA, AWOS 1991 – 2000

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg	1.6	1.2	1.9	2.0	1.8	1.4	1.4	1.2	1.6	1.6	1.4	1.4	1.6
Max	4	2	4	2	3	3	4	2	6	3	4	4	5
Min	1	1	1	2	1	1	1	1	1	1	1	1	1

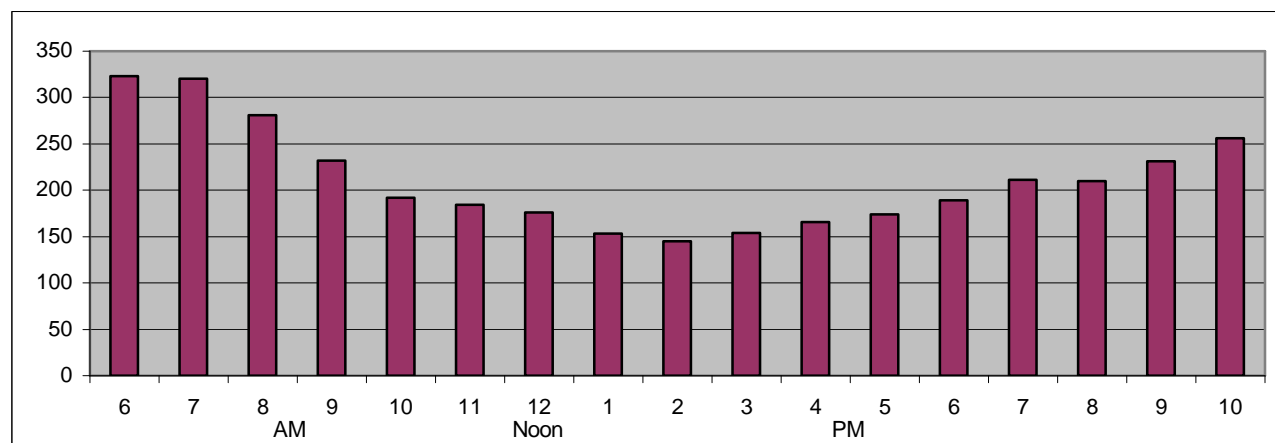
Source: National Climatic Data Center. KIA AWOS, 1991-2000

Figure 4 presents the counts of records for the time of day when ceiling and visibility fell below VFR minimums (1,000 ceiling, 3 miles visibility). As shown in the table, conditions below VFR minimums most frequently occurred during early mornings from 6 am to 9 am and again in the evenings from 7 pm to 10 pm. The least number of records for VFR conditions below minimums are for between noon and 5 pm. Hours earlier than 6 am and later than 10 pm were not included in the analysis since the Ketchikan FSS does not operate during these times.

Figure 4

Counts of Records Below VFR Minimums by Time of Day

KIA, AWOS 1991 – 2000



Source: National Climatic Data Center. KIA AWOS, 1991-2000

Conditions during which Part 135 operators are required to use Exemption No. 4760 are assumed to occur during the same time of day as conditions below 1,000 feet ceiling and 3 miles visibility and in similar proportions to the duration estimates (Tables 10, 11, 12). In all cases, meteorological conditions and the relative frequency of occurrence are assumed to remain relatively stable through the 20-year forecast.

### **3.4 Conclusions**

- Ketchikan airspace does not prescribe minimum altitudes for general aviation (GA) pilots under VFR operations. GA pilots only need to remain 500 feet from any person or manmade structure unless taking off or landing. Commercial air taxi or commuter pilots operating under VFR conditions must remain 500 feet from the surface in Ketchikan airspace.
- A few certified commercial operators are currently allowed to fly down to 200 feet from the surface as long the visibility remains greater than 3 miles and wind speed does not exceed 12 knots.
- Ketchikan airspace is commonly very busy and congested. Floatplane operations are forecast to reach 162,523 and SVFR operations are forecast to reach 3,377 by 2025. SVFR operations are forecast to account for a high of 3.6% in January and a low of 0.6% in May of the total floatplane operations.
- Total hours below VFR minimums historically account for 5.7% of the total annual flying hours. Total hours below a 500-foot ceiling historically account for 1.0% of the potential annual flying hours.
- Any bridge alternative crossing the Tongass Narrows may require adjustment or elimination of SVFR minimum altitudes in Ketchikan airspace. This determination will be made by the FAA through a separate public review process. Other mitigation measures may also be identified as part of the FAA review.
- Based on the percentage of forecast SVFR floatplane operations and the percentage of hours for SVFR conditions, it is expected that the impact to SVFR aircraft operations will be a slight increase in delays as a result of a change in minimum SVFR altitudes of the exclusion of SVFR operations altogether. GA pilots and commercial pilots wishing to operate during SVFR conditions could expect to be delayed up to approximately 3 hours during mornings or evenings if SVFR operations are excluded. This delay may be unacceptable for some time-sensitive flights and will result in some cancellations.

## **4.0 References**

- Code of Federal Regulations, Title 14, Part 135 Section 203(a)(1), Exemption No. 4760.
- Code of Federal Regulations, Title 14, Part 135 Section 203, *VFR: Minimum Altitudes*.
- Code of Federal Regulations, Title 14, Part 135 Section 205, *VFR: Visibility Requirements*.
- Code of Federal Regulations, Title 14, Part 91 Section 119, *Minimum Safe Altitudes: General*.
- Code of Federal Regulations, Title 14, Part 91 Section 155, *Basic VFR weather minimums*.
- Code of Federal Regulations, Title 14, Part 91 Section 157, *Special VFR weather minimums*.
- Code of Federal Regulations, Title 14, Part 93 Section 153, *Communications*.
- Code of Federal Regulations, Title 14, Part 93 Section 155, *Aircraft operations*.
- Ketchikan Flight Service Station. 2001. Air Traffic Records, 1996 to 2000.
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- USKH. 1999. Ketchikan Airport Master Plan Update.